

Interactive comment on “Carbon fluxes in the Canadian Arctic: patterns and drivers of bacterial abundance, production and respiration on the Beaufort Sea margin” by E. Ortega-Retuerta et al.

Anonymous Referee #2

Received and published: 18 July 2012

GENERAL COMMENTS

This manuscript presents bacterial abundance and metabolism in an Arctic shelf sea environment, and investigates the balance between heterotrophy and autotrophy. The study contributes to the still comparatively scarce knowledge of microbial carbon cycling in the Arctic Ocean, and is therefore an important contribution to this field of marine science. Regulating factors of bacterial production are determined, and it is suggested that temperature and availability of labile substrates together drive the observed patterns in bacterial production. Furthermore, the role of river discharge for the observed net heterotrophy is discussed. The study is based on extensive fieldwork

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during one month, and the results are thoroughly compared to previous Arctic studies. The conclusions are supported by the data; I consider the manuscript to be of high quality.

SPECIFIC COMMENTS

Page 6026, line 17. Comparison of BP:PP ratios is said to be significant, but no statistics are given; add test results or remove “significantly”.

Page 6026, line 27-28. Does the P value refer to both comparisons (coastal vs. offshore AND surface vs. Chl max)? Please specify.

Page 6027, line 25. The regression slope was “steeper”, not “higher”.

Discussion and Tables 4 and 5. I suggest adding your own data to these tables to facilitate comparisons with previous work. Table 6 in the text is really Table 5.

Page 6030, line 12. Please add the BGE and BCD numbers based on TCR here to better illustrate the “minor changes” when using size fractionated BR.

Page 6031, line 19. The range from 0.03 to 544 is 4 orders of magnitude, not 2, right?

Page 6032, line 20-24. The percentage of DOC as amino acids should be added to the results, e.g. in Table 1 or 4. These data are important for the arguments being made, and should therefore be shown along with the other results, supported by variability and a test of differences among water masses.

Page 6032, line 27. I suggest reiterating the most important sources of organic matter to bacteria in the system to make the discussion clear.

Page 6033, line 13-16. Where would this refractory material be exported? Horizontally to fuel pelagic communities off the shelf, or vertically and fuel shelf sediment communities or burial on the shelf? Probably both, but indicating the main pathway, if known, would be useful since it has bearings for carbon cycling in this environment.

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Page 6033, line 26. Sentence starting “Therefore, a further accumulation. . .” does not follow logically onto the preceding sentence and should be reformulated. If I understand the argument right, the increase in heterotrophy needs to be smaller than the increase in organic matter supply for there to be an accumulation of (refractory) organic matter. This is presently not stated clearly enough.

MINOR COMMENTS

Page 6026, line 15. The text refers to Figure 3a, d , f, but this figure only has station numbers, no letters.

Figure 1. I suggest adding more detail to the map; point out Cape Bathurst, since this is mentioned.

Figure 4. I suggest indicating Mackenzie River mouth on this figure since it is mentioned in the text. It might be an idea indicating the BCD:PP ratio 1 by e.g. a white line.

Interactive comment on Biogeosciences Discuss., 9, 6015, 2012.